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A READER'S JOURNAL

Quantum Enigma
Physics Encounters Consciousness
by
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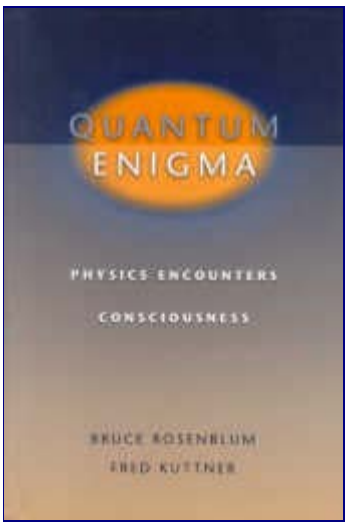


A spooky thing happens if you send a single photon through a single slit, it goes through to the other side, just like the proverbial chicken crossing the road. If you make a fence with one hole in it in the middle of the road, the chicken will cross the road going directly through the hole. If you send a chicken across the road after making two holes in the fence, sometimes it will go through the original hole and sometimes through the other hole. You can't predict which slit it will go through, but, unless you offer the chicken some feed or other inducement, it will randomly go through either slit and one can make a plot of the places of appearance on the other side of the road and get a pattern of occurrences. If we are called upon to explain this curious behavior, we might say, "A chicken has a mind of its own" or "A chicken is unpredictable" but we would *not* see any enigma. But a photon *behaves the same way as the chicken*, and that's an enigma, an example of the eponymous *quantum enigma*(1).

How does the photon know there is a second slit that's been added which causes it to split into two potential photons and recombine on the other side of the two slits exactly as predicted by quantum theory? It's an enigma. We physicists know it happens, and we can't explain why.

Thereupon hangs the tale, one of many, the authors deal with between the covers of this book. Open the front cover of this book and you're like a chicken crossing the road: there are 17 gates or holes in the fence, chapters, through which you can get through to the back cover of the book. You will find yourself split into multiple parts at times from the puzzling effects reported, but ever and anon you will arrive at this statement in the final chapter on page 202, "When experts disagree, you may choose your expert." At that point, your wave function will collapse and all 17 superpositioned versions of you will coalesce into your unity self, allowing you to leave the Temple of Quantum Reality and tell others, "I have glimpsed the enigma."

When I was a child, my father gave me a loaded gun and showed me how to shoot it safely. That seems what the two authors are doing in this book, and thereby overcoming the objection by a colleague to their physics course upon which this book is based:

> **[page 1] Though what you're saying is correct, presenting this material to nonscientists is the intellectual equivalent of allowing children to play with guns.**

Even though Dad let me handle loaded guns, my physics professors didn't, obviously coming from the same school of thought as the authors' colleague above. What I mean is that never was any quantum enigma mentioned when I took Quantum Physics courses in the senior year of my Bachelor's Degree. Certainly by 1961 the effect was known and had been debated among physicists for over fifty years among themselves, but no hint of enigma was allowed to coalesce itself in the Halls of Academe. We were taught

about the probability function which produced exact calculations, of how to calculate with Schrödinger's Wave Equation, but enigma was a no-no. When I began reading books about quantum physics around 1976 onward, I marveled at the amazing and puzzling aspects of quantum reality. If one tried to explain these effects, one became tied up in knots and frustration. Quantum effects are just not explainable, and so mostly physics gets done by sticking to the calculation and ignoring the explanations, up until now.

That the authors have a physics course which presents the enigma to college students is amazing. It led me to buy this book, so I could read in one place a comprehensive study of what I had encountered bits and pieces of in other places.(2) I was not disappointed. They had rounded up the usual suspects and placed them in a line-up for my inspection and gave me their individual rap sheets to peruse carefully. These were indeed an odd bunch of chickens, as I expect you'll agree if you stay with me through this review.

After all my talk about an enigma and their colleague's caveat, one would expect that the book contains controversial material about which many physicists disagree. One would be disappointed to find the opposite is true.

> **[page 1] This is a controversial book. But nothing we say about *quantum mechanics* is controversial. The experimental results we report and our explanation of them with quantum theory are completely undisputed. It is the mystery these results imply *beyond* physics that is *hotly* disputed. For many physicists, this mystery, the quantum enigma, is best not talked bout. It displays physics' encounter with consciousness. It's the skeleton in our closet.**

In the early 1970s my wife at that time took a course entitled, "Physics for Poets", and it was the beginning of a genre of physics courses for nonscience students of the ilk of the course of the authors, who have boldly expanded the course into the strange world of the Quantum Enigma and created the most popular physics course at Univ. of Calif. Santa Cruz. (Page 5)

The authors offer us an interesting parable in a mythical land called Neg Ahne Poc inhabited by the Rhob. A man visits there and finds that the Quantum Enigma can be demonstrated with life-sized objects. He is given a demonstration in which there are two huts and a man and a woman. He dons a hood as the couple arrange themselves in the huts, then takes it off and asks one of two questions:

> **1) In which hut is the man, and in which hut is the woman?**
> **2) In which hut is the couple?**

When he asks question 1) the doors are opened, showing the man in one hut and the woman in the other hut. When he asks question 2) the doors are opened, showing the couple together in one of the two huts and the other hut empty. He mixes up the order of the questions at random and every time, the answers are consistent. Sometimes the answer to question 1) shows the man in the left and the woman in the right and sometimes it's vice versa. Sometimes the answer to question 2 shows the couple in the left hut and sometimes in the right hut. But *never* does the couple show up together in either hut in answer to question 1) and *never* does the man and woman show up alone in either hut in answer to question 2). The lesson of the parable is that the way you ask the question, which question you ask, question 1) or question 2), determines what you will find. Incredible as this may sound to you, this is a Quantum Fact, and no exception has ever been found to this fact. Now this being a *quantum* fact means that it only applies on a microscopic scale and not on the macroscopic scale as demonstrated in the parable or metaphor above. Quantum effects of various sorts are being demonstrated on links of molecules which are visible under microscopes, and whether macroscopic objects are subject to such observer effects is debatable.

We live in a world where our view of reality is shaken when we begin to observe quantum effects. Photons move more like mobile chickens than billiard balls. Imagine a quantum pool table where you aim for a pocket on a table with one pocket and the ball goes right in. Then add a full complement of pockets and aim for the same original pocket and the billiard ball will go into one of the pockets. Shoot hundreds of balls at the one pocket and count the balls in each pocket, and you will find a distribution of balls

among the pockets which will be the same each time you do the experiment. Quantum theory allows us to calculate that distribution, but it *cannot* predict which pocket the next ball will go into, only the probability that the next ball will go into that pocket.

> **[page 23] Quantum mechanics conflicts violently not only with our intuition but perhaps even with the scientific worldview we have held since the 1600s. Nevertheless, because quantum theory satisfies Galileo's criterion — that of experimental verification — physicists readily accept it as the underlying basis of all physic and thus of all science.**

In a book on physics, it is surprising to find acknowledgment of a connection between two previous incarnations of the human spirit who most recently inhabited Rudolf Steiner, an Austrian-born philosopher and spiritual scientist. What Aristotle formulated, Aquinas later embodied in the dogma of the Church, and Steiner later, as if seeing finally the error of hide-bound Aristotelian principles locked into the physical world, extended science to include spiritual science, once more ahead of his own time, as he was when he lived as the personalities of Aristotle and then of Aquinas.

> **[page 24] These thinkers of the Golden Age launched the scientific endeavor, but, without a method to establish agreement, progress was impossible. Though Aristotle established no consensus in his own day, in the late Middle Ages his views became the official dogma of the Church, mostly through the effort of Thomas Aquinas.**

Since Aristotle's teaching were *orthodox*, any teaching or reasoning which contradicted Aristotle were called *paradox*. When the Church wanted to talk about teaching outside of its own orthodoxy, it needed a different word, choosing the Greek word *herein* — meaning *optional or choice* to create its words, *heresy* and *heretic*.

This next passage makes an argument which I heard and read many times and in many places which states that the Copernican heliocentric view of the cosmos is the right and only one to be used. It supposedly replaced the outmoded and old-fashioned geocentric view of the cosmos which must be left in the trash bin of history.

> **[page 25] Earth "obviously" stood still. One *felt* no motion. A dropped stone would be left behind on a moving Earth! If Earth moved, since air occupied all space, a great wind would blow! Moreover, a moving Earth conflicted with the wisdom of the Golden Age. Such arguments were hard to refute. And, most disturbingly, the Copernican system was seen to contradict the Bible, and doubting the Bible threatened salvation.**

Let us examine some presuppositions in the passage and set the record straight, removing the "obvious" hard scientific biases which blind scientists like the authors to reality of the spiritual world, biases which the ancient peoples did not have. The ancients were not concerned with motion in the physical world, but rather motion in the spiritual world. Each night during sleep and during the time between death and a rebirth, the human spirit

expands from the Earth outward, passing first the Moon, then Venus, then Mercury, then Sun, Mars, Jupiter, and Saturn. With the clairvoyance possessed by the average ancient human and no longer by the average modern human, they were able to perceive these realities and draw pictures of what they saw, such as in the diagram at right which appeared on a recent cover of an Oxford University Press catalog. When you use a location as a home base, you naturally treat the base as standing still, like the home plate of a baseball diamond, even though the Earth on which it is located is moving through space.

It seems to me unlikely that the ancients ever considered such things emphasized by *italics* and exclamations points in the page 25 passage. Those thoughts of a "dropping stone" or a "great wind" are but backward projections from our present knowledge, not legitimate examples of what the ancients thought. By the time of Copernicus, the ancient clairvoyance had waned so greatly that the majority of humans could *no longer* see into the spiritual realities, and it was those people who argued about a moving Earth conflicting with the Bible as a big deal. For space travelers taking their physical bodies along, the Copernican heliocentric system is the better choice; for those who leave their physical bodies home in bed, the ancient geocentric system is the better choice.

In another place, talking about Newton, the authors once more ridicule valid spiritual science concepts which they do not understand.

> **[page 33] Before Newton, explanations were mystical — and largely useless. If planets were pushed by angels, and rocks fell because of their innate desire for the cosmic center, if seeds sprouted craving to emulate their mature relatives, who could deny the influence of other occult forces? If that the phases of the moon or incantations might be relevant? The flu, its full name "influenza," is so named because it was originally explained in terms of a supernatural *influence.***

Before Newton, people made explanations made based on their direct spiritual perception, something that moderns do not have access to. Because we are unable to perceive the realities the ancients pointed to, the ancients' explanations are considered by the authors as "useless." If the authors studied the spiritual basis of the evolution of our cosmos, they would be shocked to discover that the planets were initially pushed

by angels. Steiner discusses how a modern teacher shows her pupils how our Solar System got its start by placing a large drop of black ink into a viscous fluid and stirring it with a rod to show how smaller drops of ink separate out of the larger drop, just as the planets are supposed to have coalesced out of the primordial mist to form our Solar System. The problem is that the teacher provided the outside force which got the motion started in the classroom demonstration. What got the motion started in our Solar System? Hard scientists say, "Oh, it just started moving." But that explanation begs the question and violates the most basic of Newton's laws, "A body will remain at rest until acted on by an outside force." In a universe inhabited by higher spiritual beings, the initial motion of a local cosmos such as ours owes its existence to the outside forces provided by spiritual beings. This is a reality we will likely discover as we continue to explore quantum realities deeper. We already have a dark matter and dark energy postulation — maybe next a dark energy which sets nascent galaxies and solar systems spinning.

Humans felt an innate desire for Earth as the cosmic center of their universe and naturally projected that desire onto rocks and other things. As for flu, with all the research of medical science proving the existence of a virus which causes flu, not everyone gets flu, and no one can explain why one person does and another one doesn't. An explanation requires a holistic look at the whole person, the human being in body, soul, and spirit. Materialistic scientists with no clue as to how to do such a thing simply make a causal connection between bacteria and viruses and diseases and neglect the influences of which the whole human being brings to bear on its health. Louis Pasteur fought with Claude Bernard over this exact issue, claiming bacteria caused diseases, and Bernard that bacteria was simply the physically identifiable agent, but not the whole explanation. On his deathbed, Pasteur was reported to have said, "Claude was right."

Much of the debate over the quantum enigma can be understood as a battle between the map and the territory. Newton gave us a map for how the world operated, and everyone was happy. Then Einstein showed us discrepancies in Newton's map and gave us a new map and everyone was happy. But while Einstein was still alive, quantum theory gave us a map about how microscopic events happened when we recorded them with macroscopic instruments, and that map could only predict probabilities and Einstein was unhappy, for no longer did we have a map for the basic elements of our world on the microscopic level. In fact, what we could understand from the wave equations and various interpretations of the quantum world showed us that *no map* was possible of that world. Our world had a reality which was stranger than our maps. Physicists for the most part were chagrined by this reality, as they dealt with maps of the world, and now their map model method had failed them, and even predicted that no map would ever be found! Philosophers, on the other hand, smiled because they loved paradoxes and failed maps, seeing fertile ground to be plowed where most physicists saw barren ground better left alone.

For my part, as a physicist and a philosopher, I became deeply interested in physics when I first heard of the quantum enigma. I had wandered from physics into the study of computers, systems theory, psychology, and the quantum enigma led me back to this fertile ground of the physics which I was unschooled in academically because its paradoxes were hidden from me by professors who were mostly intent on teaching us to calculate instead of think. With my study in the twenty years of the spiritual science of Rudolf Steiner, I see in the quantum enigma hints of humankind's technological seeking encountering a limit at the boundaries of the physical world and finding itself impotent in moving further in its understanding of what it is finding because it is encountering the spiritual world which operates in an inverted fashion compared to the physical world. The quantum enigma is a phrase which describes the meeting of the spiritual and physical world, two incompatible systems. Such systems, at the point where they meet create a chaos or turbulence which cannot be understood from either side(3). We can only calculate probabilities from this side and explanations or maps for what is happening will ever escape our materialistically-minded physicists. Such physicists take little comfort in Walt Kelly's saying which he put in Pogo's mouth back in the 1960s, "We has met the enemy, and he is us." The empirical tools of the physicist going back to Francis Bacon prevent them from understanding the physical basis of quantum phenomena, likely because, in my opinion, there is *no physical basis*, only physically observable results of our measurements. We have reached the point where our concept of physical has disintegrated, and

quantum enigma is the name we have given to our confusion.

My preliminary thoughts on the matter will not make sense to most physicists, but here goes. When one goes to sleep at night, one's spirit expands to the extent of the physical universe at a rate that makes Star Trek's Warp 10 seems snail-like by comparison. The speed of spirit is infinite and thus the simultaneous transitions of two once-connected objects separated by billions of light-years, as required by the Einstein-Poldosky-Rosen paradox, seem to provide proof that the quantum enigma reveals that our instruments are discovering a reality which we have ignored and forgotten for over six centuries, the reality of the spiritual world. It will no doubt greatly upset physicists to have to admit that "planets were pushed by angels", after all.

If the spiritual world exists, as I have no doubt that it does, then it is clear that the world exists independently of its observation in the physical world. Realism, whether the hard form mentioned below or not, is only one of twelve ways of understanding the world, but an understanding is a model, a map of the world, and there is always more world than our map. Alfred Korzybski wrote, "The map is *not* the territory; it cannot represent all the territory." The territory is what he identifies by the wonderful acronym WIGO, which refers to What Is Going On. Clearly to me, the WIGO of the world includes the spiritual world, and none of the maps of physicists include the spiritual world, up until now. At least, not consciously. But the quantum enigma is pointing physicists towards it and highlighting it, for those who care.

In my undergraduate study of physics, not a single student or professor that I encountered cared about the quantum enigma. And yet, according to the authors of this book, college students are very interested in the subject today. Something is resonating within these students which did not resonate within college students fifty years ago. Rightly understood, our age of materialism is waning and a new age of spirituality is waxing before our eyes. But this new age will not discard outright materialism, as our adventure into materialism discarded spirituality 600 years ago. Actually our materialistic age stood on the shoulders of spiritual thought, but this is not readily known and even less admitted by scientists of today. On the contrary, the very basics of our learning to think scientifically originated from ways of thinking which I have often heard ridiculed. Here's an example of ridiculing by presupposition, "Why, that's as ridiculous as arguing 'How many angels can dance on the head of a pin!'" Perhaps you've heard something like that. Who made such arguments about angels dancing on the head of a pin? It was the Scholastic thinkers back in the 12th through 15th centuries, and their mode of thinking represented a quantum leap for human consciousness, a leap which was to allow those who followed Francis Bacon, after he suggested that our thinking and reasoning should be devoted to the physical world, to begin to create with the help of Galileo, Newton, etal, the technological revolution which has apparently brought us today to the edge of the spiritual world.

One is forced by the scientific establishment to characterize my views as bizarre because I am seen as thinking outside their even more bizarre box of limitations and explanations. Remember when phlogiston(4) explanations got so bizarre that Lavoisier had to propose oxygen as a solution? Given the choice between supporting an accepted phlogiston idea or a radically new idea like oxygen, most of the scientific establishment chose phlogiston.

> **[page 34] Philosophers have taken varied — even bizarre — stands on the nature of reality long before quantum mechanics. A conventional philosophical stance called "realism" has the existence of the physical world being independent of its observation. A more drastic version denies the existence of anything *beyond* physical objects. In this "materialistic" view, consciousness, for example, should be completely understandable, in principle at least, in terms of the electrochemical properties of the brain. The tacit acceptance of such a materialist view, even its explicit defense, is not uncommon today.**

When I graduated with a physics degree in 1962, all my academic career had taught me is that I might

work trying to add a decimal point or two to the precision at which we were able to measure the physical world. In other words, I had accepted whole hog the judgment of Lord Kelvin, some 70 years earlier which graces the head of Chapter 5 of this book:

> **[page 39] There is nothing new to be discovered in physics now. All that remains is more and more precise measurement. — Lord Kelvin (in 1894)**

The world of physics was to change dramatically in short order with the appearance of Bohr(5), Einstein, Planck, Heisenberg, Schrödinger, and others who ushered upon the world stage quantum mechanics, relativity, the uncertainty principle, and the wave equation. By the time I attended college these were so well fleshed out, that Kelvin's judgment seemed likewise to apply to the field of physics once more. But unknown to me, lurking behind the scenes was the quantum enigma.

After the work of Einstein and Bohr, it seemed clear that photons and electrons were particles, and one dissenting voice came from Louis de Broglie who showed that electrons could also be treated as waves in the Bohr atom.

> **[page 67] De Broglie took his speculation to his thesis adviser, Paul Langevin, famous for his work on magnetism. Langevin was not impressed. He noted that in deriving Bohr's formula de Broglie merely replaced one ad hoc assumption with another. And de Broglie's assumption, that electrons could be waves, seemed ridiculous.**

But an accident at the telephone company happened in the vacuum tube department which was to demonstrate that electrons had wave properties, confirming de Broglie’s speculation and laying the foundation for the wave theory of matter to follow.

> **[page 67] Electrons usually bounced off a rough metal surface in all directions. But after the accident, in which a leak allowed air into his vacuum system and oxidized a nickel surface, Davisson heated the metal surface to drive off the oxygen. The nickel crystallized, essentially forming an array of slits. Electrons now bounced off in only a few well-defined directions. It was an interference pattern demonstrating the electron's wave nature. The discovery confirmed de Broglie's speculation that material objects could also be waves.**

Schrödinger picked up the ball and created his famous wave equation as a way of eliminating the pesky quantum jumps of Bohr as he called them, but he was surprised that his waves were demonstrating equally puzzling effects which challenged any realistic understanding of the underlying microscopic world.

> **[page 75] If an actual physical object were smeared over the extent of its waviness, its remote parts would have to instantaneously coalesce to the place where the whole object were found. Physical matter would have to move at speeds greater than that of light. That's impossible.**

And yet, the soul and spirit of every physicist when awakened from a dream re-coalesces instantaneously from the edges of the universe. Perhaps physical matter is not actually physical. Physicists calculate the probability that a wave will coalesce in one place, but that is *not* the probability of there *being* an object there, an important difference.

> **[page 75] The waviness in a region is the probability of *finding* the object in that region. Be careful — the waviness is not the probability of the object *being* there. There's the crucial difference! The object was not there before you found it there. Your happening to find it there *caused* it to be there. This is tricky and the essence of the quantum enigma.**

If we accept the time-honored notion of cause and effect in the physical world, then we must admit that quantum events do not follow that notion at all. Perhaps our notion of cause and effect should be replaced by the notion that it all happens at the same time? When we find a so-called object in a region, there was no object there beforehand. Our act of finding coincided with the appearance of the object where we found it. We both arrived there at the same time. Quantum mechanics allows us to calculate the probability of that simultaneous occurrence happening. When our macrocosmic world of measurement interacts with the microscopic world of quantum effects, *it all happens at the same time(6)*.

Let us now examine what happens if you apply cause-effect logic to objects on a microscopic scale. The thought experiment is called "An Atom in a Box Pair". First one needs to run the atom through a semitransparent atom-mirror which divides the atom's wave function into two wave packets, which go into each of the two boxes. Note how the authors talk about an "object" in two places and confront the enigma which arises from talking about them as objects. Focus on how the authors talk about objects — the magnetic orientation of the atom has a "north pole" attached to it even though our Earth has no actual north pole, it's only a way we have of talking about a specific location around which our planet rotates. Also note that applying my notion "it all happens at the same time" makes the entire situation easier to understand.

> **[page 78, 79] Holding an atom in a box pair without disturbing its wavefunction would be tricky, but possible. Dividing the wavefunction of an atom into two well-separated regions is frequently accomplished, and that's all we really need for our story. We like to think of each region defined by a box because it's more like the shell game.**
>
> **But, unlike the classical shell game, where the pea was in fact under one shell or the other, quantum theory says the waviness, and therefore the atom, is *simultaneously in both boxes.* What can that possibly mean? We establish that with an interference experiment, the standard demonstration of the wave phenomena.**
>
> **We open a small hole in each box of the pair at about the same time. The wavefunction leaks out of *both* boxes and falls on a screen to which an atom will stick. In some places on the screen, waves from the two boxes will reinforce each other, and at other places waves will cancel. Repeating this with many identically positioned box pairs, atoms will be found in regions of large waviness.**
>
> **That's the crucial point: *Each and every* atom follows a rule allowing it to land in regions separated by distance "d" in figure 7.10. That rule depends on the box-pair spacing "s." Therefore, each atom had to "know" the box-pair spacing. According to quantum theory, each atom knows the rule because each atom was in both boxes at the same time.**
>
> **Wouldn't it make more sense to say that *part* of each atom was in each box? No, that doesn't work. How do we establish that?**
>
> **Suppose, instead of doing an interference experiment, we just look in a box to see which one held the atom. It doesn't matter how we look. We can, for example, actually shine an appropriate light beam into the box and see a glint from the atom. About half the time we will find a whole atom in the looked-in box; about half the time we find the box empty. If there is no atom in the box we look in first, it will always be in the other.**
>
> **But before we looked, an interference experiment could have established that the unobserved atom had been in both boxes. The atom didn't have a single position. But, on looking, we find the whole atom in a single box.**
>
> **The most accurate way of describing the state of the unobserved atom is to put into English the mathematics describing the state of the atom before we looked to see where it is: The atom was *simultaneously in two states;* in the first state, it is in-the-top-box-and-not-in-the-bottom-box, and simultaneously in the second state, it is in-the-bottom-box-and-not-in-the-top-box.**
>
> **Putting it this way, however, boggles the mind. It's saying a physical thing was in two places at the same time. The quantum mechanical term for this situation is that the atom is in a "superposition state" simultaneously in both boxes.**

> **We should not leave this discussion without emphasizing that what we have said about the position of an object being created by observation applies to every other property. For example, an atomic nucleus is a tiny magnet with a north and a south pole. It can be in a superposition state with its north pole simultaneously pointing up and down.**
>
> **An object in two places at once is so counterintuitive that it is inevitably confusing. Some of the confusion will probably be straightened out in our later chapters. But not all of it! We have confronted the still unresolved and definitely controversial quantum enigma.**

Alfred Korzybski elaborated on the deleterious semantic effect of the usage of the verb "to be" in English in his classic book on General Semantics, Science and Sanity. Over seventy years later, scientists such as the authors of this book are still using the verb "to be" in English. Check the eighth paragraph in the long passage quoted above. The quantum enigma arises from putting the mathematics into *English!* A clear demonstration of what Korzybski wrote on page 202 of his book, "The 'is' of identity plays a great havoc with our semantic reactions, as any 'identity' is structurally false to fact." No wonder the authors claim "putting it this way boggles the mind" — the word *boggle* indicates the presence of a semantic reaction!

The authors give many examples in Chapter 8 of how quantum effects make possible technology which comprises "One-Third of Our Economy" as stated in the title, elaborating specifically on transistors, lasers, and MRI's and pointing forward to quantum computers. And they explain how little the quantum enigma bothers these scientists and engineers.

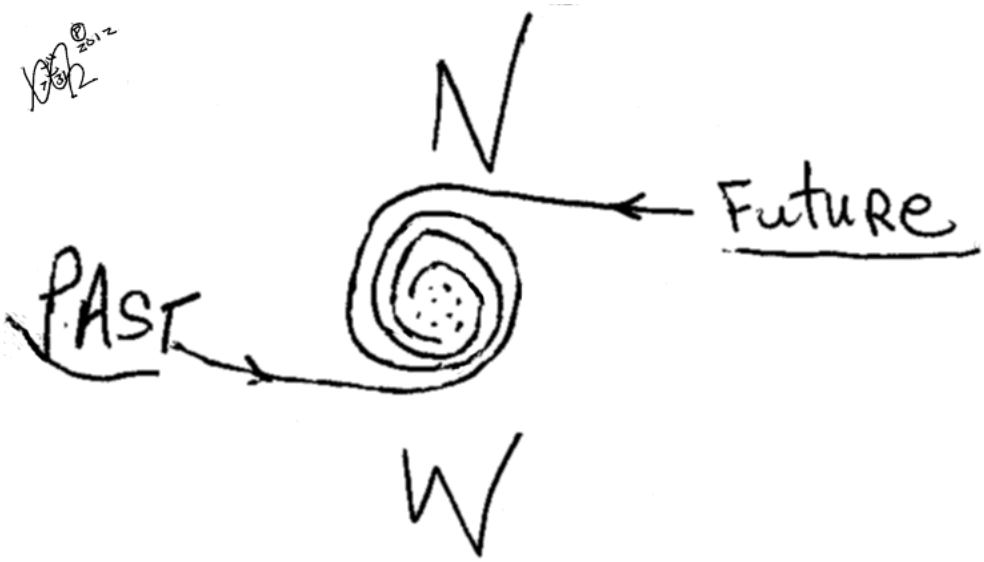
> **[page 83] Engineers and physicists who work with the technologies we have spoken of may deal intimately with quantum mechanics on an everyday basis, but they never need to face up to the deeper issues raised by quantum mechanics. Many are not even aware of them. In teaching quantum mechanics, physicists, including us, minimize the enigmatic aspect in order not to distract students from the practical stuff they will need to use. We also avoid the enigma because it is a bit embarrassing; it's been called our "skeleton in the closet."**

Methinks I hear the ghost of Alfred Korzybski rattling his skeleton in the closet. Engineers and physicists working in technologies use mostly *English prime* — that is English without the verb "to-be" used as identification. They are interested in how things *work* not what they *are*, and thus the quantum enigma never arises in their work.

Here's an example of how the quantum enigma seems to be telling us that we create the past in the present.

> **[page 94] But our physicist hesitates, and again seems evasive: "What existed before we looked, what you call 'a physically real world,' is another issue most physicists prefer to leave to philosophers. For all practical purposes, all we need to deal with is what we see when we actually do look."**
>
> **"But you're saying something crazy about the world! You're saying that what previously existed is created by the way we look at something," is his unsatisfied response. Most heads nod in agreement; others seem baffled.**

If you wonder why I don't seem baffled, it's likely because I encountered these ideas in Jane Roberts' Seth Books back in the 1970s, specifically in The Unknown Reality. The idea



that we create the past in the present seems quite natural to me as well as the idea that a time wave from the future comes to us in the form of a feeling(7). Clearly the idea that a feeling is an important part of reality was never taught to me in a physics course — there are no *Maxwell's Equations for feelings!*
Here are some thoughts from the Seth book which deal with feelings and time:

From my review of The Unknown Reality:

> **[page 140, Seth] On the one hand as a species your present forms your future, but in even deeper terms your precognitive awareness of your own possibilities from the future helps to form the present that will then make that probable future your reality.**

[RJM] Our thoughts and feelings are quite real, but as a physicist I was taught to distrust feelings and trust diagrams. Seth must have taken some of the same physics courses I did by the sound of what he says about diagrams:

> **[page 221, Seth] But most physicists do not trust felt answers. Feeling is thought to be far less valid than a diagram. It seems you could not operate your world on feelings — but you are not doing very well trying to operate with diagrams, either!**

The next passage from the same review illuminates the problem of using macroscopic instruments to measure events happening on a microscopic level, the very source of the quantum enigma.

[RJM] As the indigenous Southern philosopher, Pogo, once said, "What's so bad about the blind leading the blind? The seeing been leading the seeing all these years and see where that got us." What does this all mean? It means that when we use our instruments to probe reality, we can only discover a reality that exists at the same level as our instruments. With our man-made instruments we are like the blind being led by the blind.

> **[page 226, Seth] Ultimately your use of instruments, and your preoccupation with them as tools to study the greater nature of reality, will teach you one important lesson: The instruments are useful only in measuring the level of reality in which they themselves exist. Period.**

When we strive to delineate a reality that exists at a level below our instruments, we learn an important lesson: we find only paradoxes and the quantum enigma.

It's time now to revisit Neg Ahne Poc the mythical land whose people were named the Rhob, which is Bohr spelled backwards, and the land's name is Copenhagen spelled backwards. *Lufred Now, Lufred Now, Neg Ahne Poc!*(8) I find it insightful, if unconsciously intended, that the authors use a backwards spelling for a name of a land which has quantum effects visible at the macroscopic level, because I suspect that the strange land of the quantum represents our first encounter with the world of spiritual reality. Rudolf Steiner explains that when we experience the spiritual world, we find everything is reversed from our physical reality, both in space and time(9).

When the authors say that "microscopic objects themselves are not real things," they mean, but cannot bring themselves to say aloud, that they must be spiritual realities, not physical realities. Clearly spiritual realities are unreal to physicists, but they cannot say it right out. Instead, they quote Heisenberg who also says the objects are not real:

> **[page 104] In the experiments about atomic events we have to do with things and facts, the phenomena that are just as real as any phenomena in daily life. *But the atoms or elementary particles themselves are not real;* they form a world of potentialities or possibilities rather than one of things or facts. (emphasis added by authors)**

The alternative is to abandon "realism", but that causes a problem among physicists who want to hold onto Mother Physics's apron strings of scientific realism.

> **[page 112] Everyone is willing to abandon naive realism. But few of our colleagues are willing to abandon "scientific realism," defined as "the thesis that the objects of scientific knowledge exist and act independently of the knowledge of them." Admitting that quantum theory says that the existence of objects of the micro world depends on the knowledge of them, they would claim that the "knowledge" held by, say, a Geiger counter is sufficient to bring about that existence.**

Others are more blunt about how to proceed in the face of the quantum enigma and we should allow them their terse rant, "Shut up and calculate!" (Page 112) The rant contains no verb "to-be" and avoids the quantum enigma.

The remainder of the book deals with Schrödinger's Cat, a modern scientific metaphor of a Cheshire Cat which is sometimes there and sometimes not there at the same time, and the Bell Theorem, both of which have weird implications about reality. Both of these we have discussed in more general terms before. The atom that is in Box A or Box B is replaced by a live cat in one box which will be killed if some quantum effect is observed in the box. Given the probability of the quantum event, the cat will be either alive or dead in the box at any time until we actually observe the cat. If we go on a cruise for a week and open the box when we get back we will either find a hungry cat or a dead cat. Since the cat's condition occurs only when we open the box, if we see a cat dead about 7 days, the past of the cat must be created on the spot in the condition of a cat 7 days dead. Spooky, but true.

> **[page 124] Indeed, if someone on trial convinced the jury that he believed that his looking created the physical world, the jury would likely accept the plea of insanity.**

The Bell Theorem concerns the objects once together who then fly apart to the ends of the universe, but the choice of measurement of one of the objects will determine instantly the condition of the other object when it is measured. John Bell proposed a theorem which could be used to prove whether this is true, and in recent decades when it became possible to perform the experiments, the results were exactly as quantum theory predicted, with all its weirdness. What weirdness? It proved that our world is neither real (not created by observation) nor separable (objects can affect each other without physical forces). That's my surmise from the results: neither real nor separable.

> **[page 143] When the experiments were done, Bell's inequality was violated. Bell's straw man was knocked down — as he expected it would be. Our world does not have both**

> **reality and separability. And we immediately admit to not truly understanding what the world being unreal or having a universal connectedness would imply.**

To me the answer, the way to understanding, is to admit that our maps reveal a world that is not comprehensible by maps. Does that mean we live in an incomprehensible world? No, not necessarily. It means that physicists live in an incomprehensible world and the skeleton in their closet, which they prefer to not mention, proves that to be the case. The difference between how establishment physicists and graduate students in physics grapple with these issues speaks volumes. The authors report on two conferences where they dared to take the skeleton out of the closet in public.

> **[page 154] When I spoke of our interest in the issues of consciousness raised at the two conferences, I was heckled by some senior faculty: "You guys are taking physics back to the Dark Ages!" And: "Spend your time doing good physics, not this nonsense!"**

When professors rant in this fashion, it leads me to suspect that they have some fear associated with the ideas expressed by the authors. Where might this fear stem from? Might it be from some deep knowledge which the professors have, but of which they are unaware? Rudolf Steiner saw a lot of such irrational fears in his time when he was lecturing and writing on his spiritual science. In his lecture in Stuttgart on December 21, 1919, he spoke:

> **[page 1, 2 of Cosmic New Year] For how, according to some people, at a time when we have come so wonderfully far, could people have any kind of fear of knowledge? Indeed, people today believe they are able to encompass nearly everything with their intellectual powers. But people are not generally conscious of this fear that I have often described. In their consciousness people pretend that they are brave enough to receive every kind of knowledge, but deep in the unknown part of the soul (which today people basically don't want to acknowledge) there sits this unconscious fear. Because these people have this unconscious fear, there rise up in them all kinds of reason that they claim to be logical objections against spiritual science. However, they are only emanations of the unconscious fear of the science of the spirit that reigns in human souls. For in the depths of the soul every human being really knows much more than is known intellectually. We do not want this knowledge rooted in the depths of the soul life to rise to consciousness, because we are just afraid of it. Above all else, the human being divines this about the supersensible worlds: in everything we call thinking, in everything in the world of thoughts, something of the supersensible world can be found.**

But the graduate students have no such fear, but rather are excited about the new possibilities unleashed by the quantum enigma and its experimental results and what it means for the new way of understanding the world which is quickly approaching.

> **[page 154] Physics graduate students in the audience, on the other hand, seemed fascinated. Not surprisingly. Younger physicists today are generally more open to the idea that there are problems with the foundations of quantum theory.**

In spite of having written this fine book laying out the case of the quantum enigma, the authors admit to feeling embarrassment when the ideas lend support to or resonate with what so-called metaphysical teachers have averred for many centuries. Since embarrassment is an emotion which reveals a secret pleasure, there must be something true resonating deep within the authors, but which they cannot access consciously and therefore, instead, feel that truth as the emotion they call embarrassment.

> **[page 154] We're not unsympathetic with the reaction of some colleagues. Our discipline's encounter with consciousness sometimes embarrasses us as well — particularly when the encounter is claimed to confirm metaphysical philosophies. Even though, as we've said earlier, quantum mechanics can seem to resonate with such ideas.**

One can find no better example of the condition of human beings in the eyes of physicists than the statement by Murray-Gellman(10) which heads his discussion of quantum physics, "The universe presumably couldn't care less whether human beings evolved on *some obscure planet* to study its history; it goes on obeying the quantum-mechanical laws of physics irrespective of observation by physicists." (Page 156, emphasis added) In my opinion, one cannot understand the reality of the spiritual world and how humans fit into it and call our home base *some obscure planet*.

We are all travelers of the universe each time we nod off during a nap or go to sleep for the night. As such we are both observers of the universe, *and* we care about the *very important planet* which forms the center of the universe for us. Want to choose your own expert to decide about this matter? The authors give us this instruction on page 202, "When experts disagree, you may choose your expert." My suggestion for choosing your expert is this: Look no further than the mirror!

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---------- ***Footnotes*** ----------

Footnote 1. This metaphor is highly strained because a photon has a more regular behavior than a chicken — when you send a large number of photons through the two slits, a predictable interference pattern will result. But if you send a large number of chickens through, the result will likely be completely unpredictable. In addition, as my wife and copy-editor, Del, points out: a single chicken will not split when the second hole in the fence appears.

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Footnote 2. You can read reviews, often short ones, of the quantum reality books I have read over the past thirty years here: A Reader's Journal 1, A Reader's Treasury, and A Reader's Journal 2. These books have been very useful in acquainting me with the various aspects of quantum enigma outlined in this book.

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Footnote 3. It is not my intent to suggest that quantum particles exist in the spiritual world, but rather that they are directly on this side of the boundary between the spiritual world and the physical world. It is as if these so-called particles can pop in and out of the spiritual world, going from spread-to-the-limits-of-the-universe to an infinitesimal point in no time at all, like the spirit of a human being who is nodding in and out of a nap or awakening from a deep sleep.

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Footnote 4. Phlogiston was the name given by chemists to their confusion about how the process of combustion took place before Lavoisier discovered and named oxygen. Phlogiston today would be called "negative oxygen". How bizarre is that? Phlogiston was thought to be given up during rust or combustion, processes we now know *add* oxygen!

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Footnote 5. Bohr's physics department chairman urged him to study something more exciting than physics, saying "All the important discoveries have been made." (Page 53)

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Footnote 6. Over thirty years ago, I formulated that the notion "it all happens at the same time" from events which I observed in the macroscopic world, and now it seems to offer a way of rescuing quantum theory which has difficulty sustaining itself with a notion of cause and effect. See my Matherne's Rule #4 here: http://www.doyletics.com/mrules.shtml#mrn4. The process of "it all happens at the same time" can do to the quantum enigma what oxygen did to phlogiston.

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Footnote 7. This idea is embodied in Matherne's Rule #36 Remember the future. It hums in the present.

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Footnote 8. This is the backwards spelling of a song sung by Danny Kaye in *Hans Christian Andersen* which Del remembered, "Wonderful, wonderful Copenhagen, grand ole gal of the sea. . . " Niels Bohr lived in that city and his view of quantum mechanics is called the Copenhagen interpretation.

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Footnote 9. For example, names may appear reversed, dense objects like the Sun become like vacuums, time runs backward, among many other things.

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Footnote 10. Murray-Gellman "is an American physicist who received the 1969 Nobel Prize in physics for his work on the theory of elementary particles" according to Wikipedia.

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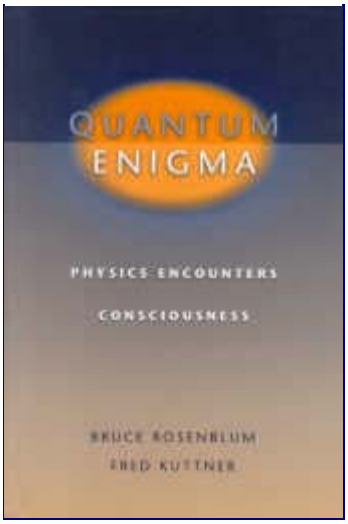
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